

## **TEETH TREATMENT DEVICE**

### **FIELD OF THE INVENTION**

- 5   The present invention relates to the method of making a dental device that can be customized to an individual patient's teeth, without the necessity of professional service. More particularly, the invention relates a method of manufacturing a device allowing individuals to brighten or bleach their own teeth without visiting a dental office or laboratory.
- 10   Other conventional treatments are also contemplated with the device of this invention.

## **BACKGROUND OF THE INVENTION**

Dental trays are receptacles that are used to carry a medicine or dental  
5 hygiene materials, such as bleaching agents or fluoride application, and  
apply them to the teeth. It confines the material next to the teeth during  
the application. Bleaching is becoming more popular with the general  
public because efforts have been made to simplify the bleaching process  
and provide devices useful for home care and treatment by individuals  
10 without professional supervision.

There are two types of dental trays: stock and customized. Stock trays  
are pre-fabricated into a variety of standard sizes. They are used only for  
preliminary procedures and to produce impressions for casting as an  
15 interim step to creating more accurate dental trays and models of teeth.  
Custom trays are made by a dentist or technician by molding a material  
over a gypsum model of the patient's teeth. In order to get the gypsum  
model, a preliminary impression is made from the patient's teeth. The  
model requires at least one dental visit and requires a laboratory to  
20 construct the gypsum model.

Once the model is made, the customized dental tray is formed by the  
dentist or lab according to the limitations of the materials to be used for  
the tray. If the tray is made of thermoplastic sheets, the tray may be  
25 formed in a vacuum forming machine or other machine which exerts

pressure. The sheets are placed in a soft state over the model and pressure is applied while the material sets.

Attempts have also been made to design simpler devices for use by the patient at home. Tarvis U. S. Patent No. 5,340,314 discloses the simplest use of dental wax, where the flat wax 14 in Fig. 2 is rolled to fit the shape of a dental plate. No suggestion of any use other than to take impressions is made in this patent. Sintov et al U. S. Patent No. 5,425,953 discloses a liquid polymer that includes a bleaching agent or other treatment agent. There is no reference to dental wax in Sintov et al. Curtis et al U. S. Patent No. 5,639,445 employs a dilatant silicone polymer composition that is shaped and pressed against the teeth for sufficient time to release the active component. The polymer in Curtis et al is elastic, putty-like in composition, and is primarily directed at removing food particles from between the teeth and/or applying a dentifrice or medicament to below the gum line. Yarborough U. S. Patent No. 5,713,738 employs laser light to activate bleaching agents applied to the teeth. Latex rubber is used to cover the mouth other than the teeth.

Sagel et al U. S. Patent No. 5,879,691 (Sagel '691) covers a delivery system using a strip of material having a low flexural stiffness. The material is generally characterized as being thin, having a flexural stiffness less than a predetermined value, readily conformable without permanent deformation, and having some adhesive properties. The preferred material is a gel and the specific preferred gel is formed from 70% glycerin, 5% carboxypolymethylene, 10% carbamide peroxide and

15% water. The material is very soft, almost mushy, and is different in kind from the dental wax which fractures when bent quickly at room temperature.

5 Sagel et al U. S. Patent No. 5,891,453 (Sagel '453) discloses an improvement on Sagel '691, in which the strip of material is any number of materials, both synthetic and natural, and would broadly include dental wax if that material, not disclosed, was as flexible as called for by the patent. The clear plastic flexible material on to which the gel is  
10 placed is much more flexible than dental wax.

Finally, Sagel et al U. S. Patent No. 5,894,017 (Sagel '017) discloses the same flexible material with a substance on it for treating teeth. This patent calls for the substance to additionally provide an adhesive  
15 attachment between the strip and the surface to hold the delivery system in place. Treatment agent 14 in Fig. 1 is an illustration of one adhesive agent.

All three Sagel et al patents provide for covering the front of the teeth  
20 but do not have a configuration suitable for covering the back of the teeth.

One embodiment of the present invention is to provide a simple method and device for whitening teeth could be provided.

Another embodiment is a method and device that uses commonly known dental materials.

Yet another embodiment is a method of making a device that is low cost

5 and yet effective.

Still another embodiment manufactures a device that can be reused by the same patient simply by rinsing and cleaning the tray.

10 One embodiment is a method of making a dental bleaching tray that can also be used for other purposes, such as fluoride treatment, anti-bacterial treatments and the like.

Other embodiments will appear hereinafter.

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## **SUMMARY OF THE INVENTION**

The present invention is an assembly of two components, referred to as the upper and lower jaw pattern forms. Pattern forms are sized to allow  
5 the device to generally conform to the patient's teeth. Both the upper jaw and lower jaw patterns are die cut from commercially available dental wax, and are formed into specific patterns with fold lines impressed thereon to permit the pattern to be folded into a three dimensional tray when contoured to teeth along those fold lines.

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The term "dental wax" is well known in the art and describes a large number of products of various compositions and components, all of which are known by this generic term. The preferred wax is paraffin wax, and the preferred dental waxes of the present invention contain at  
15 least 25 percent by weight of paraffin wax, and preferably over 40 percent by weight paraffin wax. Other components may be resins such as polyvinyl acetate and other synthetic resins that are compatible with the human body, in that they do not have a harmful affect on the user. One preferred dental wax is manufactured by Hase Petroleum Wax Co. of  
20 Arlington Heights, Illinois, and is sold under the trade name HP11168 dental wax. This preferred dental wax has a melting point of between about 140 °F and 160 °F, and softens at less than 98 °F so that it can be used as described herein.

25 The dental wax used is thin, ranging from about 0.02 to 0.08 inches thick, with 0.04 inch thickness being preferred. The wax is capable of

softening at body temperature, of less than 98.6 °F, and is contoured by being held between the user's fingers and thumb before being placed on the teeth for forming.

5 The finished tray is then removed and bleaching solutions are placed in the tray. In this embodiment the inside of the tray adjacent to the teeth is textured or scored to hold the solution. Other solutions can also be used with this tray, such as fluoride treatment, anti-bacterial treatments and the like.

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The invention provides a simple dental tray that is easily and inexpensively made without the necessities of repeat visits to a dentist or doctor, and without the necessity of sophisticated equipment or technicians.

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The method of making the device preferred in this invention comprises the steps of passing a substrate through a container having melted wax therein to form a wax saturated substrate; applying a quantity of bleaching solution to one side of said wax saturated substrate; joining a 20 thin plastic sheet to said one side of said wax saturated substrate to form a plastic coated wax saturated substrate having a quantity of bleach; cutting said plastic coated wax saturated substrate having a quantity of bleach into individual strips having a predetermined configuration; and packaging said individual strips. The preferred substrate is selected 25 from the group consisting of cheese cloth, non woven natural fiber fabric, woven natural fiber fabric, non woven synthetic fiber fabric, woven

synthetic fiber fabric, paper and combinations thereof. The preferred thickness for the cooled wax saturated substrate has a thickness ranging from about 0.01 to 0.03 inches, with 0.015 inches being preferred.

### **DESCRIPTION OF DRAWINGS**

Figure 1 is side elevational view of the lower jaw pattern of the present invention;

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Figure 2 is side elevational view of the upper jaw pattern of the present invention; and

Figure 3 is a schematic, side elevational view of the process of making  
10 the pattern products of this invention.

## **DETAILED DESCRIPTION OF THE INVENTION**

As shown in the drawings, the present invention comprises a thin dental wax pattern that can be folded to form a bleaching tray. A lower jaw 5 pattern 11 is shown in Fig. 1 and an upper jaw pattern 13 is shown in Fig. 2. Both the lower pattern 11 and the upper pattern 13 have a front edge 15 which is sized to cover the front of a user's teeth.

Both patterns 11 and 13 also have a longitudinal fold line 17 and 19, 10 respectively, which divide the patterns 11 and 13 into two parts, the front portion 21 that extends from fold line 17 in Fig. 1 or fold line 19 in Fig. 2, to front edge 15 and the back portion 23 that extends from fold line 17 to back edge 25. Back portion 23 has at least two areas 27 and 29 cut from the back portion, extending generally from the back 15 edge 25 to fold line 17, to permit the pattern to be folded to form a tray conforming to the patient's lower or upper teeth.

In the lower jaw pattern shown in Fig. 1, the fold line 17 and the front edge 15 are arcuate, defining a curve that permits better conformation 20 to the lower jaw. In Fig. 2, it is seen that the fold line 19 is straight and axial with the length of the pattern 13, and front edge 15 has a lesser arcuate curve.

As noted above, the dental wax is thin, ranging from about 0.02 to 0.08 25 inches thick, with 0.04 inch thickness being preferred. The wax is capable of softening at body temperature, of less than 98.6 °F, and is

contoured by being held between the user's fingers and thumb before being placed on the teeth for forming. Another way of warming the wax for application is to simply hold it under the warm water tap while running the warm water for a few minutes. One preferred dental wax is  
5 the previously described Hase Petroleum Wax Co. dental wax HP11168.

The preferred method of this invention is illustrated in Fig. 3, where the apparatus 31 generally has a substrate 33 stored on roller 35 that is saturated with melted wax 37 by passed the substrate 33 through a  
10 container 39 and around roller 41 to form a wax saturated substrate 43. As the saturated substrate passes around guide roller 45, a quantity of bleaching solution is sprayed onto one side of said wax saturated substrate by spray nozzle 47. A thin plastic sheet 49 is drawn from roller  
15 51 on to one side of the wax saturated substrate to form a plastic coated wax saturated substrate. The plastic coated wax saturated substrate  
43+49 moves along cutting table 53 and cutting die 55 cuts the substrate into individual strips 57a, 57b, 57c, etc., each having a predetermined configuration as described above. The strips 57a, etc. are packaged and are ready for use. The thickness of the wax coated  
20 substrate 43 can be thinner than previously thought, and preferably ranges from about from about 0.01 to 0.03 inches. Most preferred is a thickness of 0.015 inches.

The substrate can be any substrate that is flexible and is capable of  
25 absorbing wax in the process described herein. Preferred fabrics are cheese cloth, non woven natural fiber fabric, woven natural fiber fabric,

non woven synthetic fiber fabric, woven synthetic fiber fabric, paper and combinations thereof.

It should be noted that the tray of the present invention is capable of

5 covering the entire set of teeth up to the gum line or gingival margin. Once the tray is warm, it is placed against the front of the teeth and folded over the teeth to extend over the back of the teeth. Finger pressure is used to pack the tray against the front and back, and then the jaw is closed to bite gently, to replicate the tops of the teeth as well.

10 Thus a total treatment of all the teeth, or any region of the upper or lower teeth, can effectively be achieved. Finally, the top of the tray can be trimmed with scissors or a hot instrument, and then flame polished to eliminate any sharp edges.

15 The finished tray that has been formed to fit the user is then removed and bleaching solutions are placed in the tray. The inside of the tray is textured, such as by pressing during the cutting stage during manufacture, to hold the bleaching solution. Preferred bleaching solutions and other solutions that affect the appearance of the teeth are,

20 without limitation, hydrogen peroxide, carbamide peroxide, sodium fluoride, sodium monofluorophosphate, pyrophosphate, clorhexidine, polyphosphate, triclosan and enzymes. One preferred treatment agent is a chlor-haidine solution used as an antibacterial agent for the treatment of gingivitis. Another preferred treatment agent is potassium nitrate for

25 the treatment of tooth sensitivity.

As has been noted above, the present invention may be used for bleaching but other dental procedures are also within the scope of the invention, including whitening, stain bleaching, stain removal, re-mineralization, plaque removal and tartar removal. It is contemplated

5 that the tray of the present invention will cover all or only some of the patient's teeth, depending on the treatment in use. Simple cosmetic bleaching often does not include any teeth that are not visible in normal smiling and the like, such as those back from the first bicuspid.

10 The tray is now ready for use. A number of tests were performed, using the present invention, producing a whitening or bleaching of the teeth of a number of individuals, with results being substantially identical to bleaching procedures done by dentists and dental hygienists in the dental offices. The cost of using the invention described herein is much  
15 less than that of a dental office.

While particular embodiments of the present invention have been illustrated and described, it is not intended to limit the invention, except as defined by the following claims.